STANDARDS AND SPECIFICATIONS

FOR DEVELOPMENT

IN UNINCORPORATED AREAS

OF

LAKE COUNTY, OHIO

JAMES R. GILLS, P.E.
LAKE COUNTY ENGINEER

2010

STANDARDS AND SPECIFICATIONS FOR SUBDIVISIONS

CONTENTS

A. INTRODUCTION

These standards and specifications were prepared to assist the Developer/Engineer in the preparation of Subdivision Plans for review by the Office of the County Engineer. They are not intended to substitute for sound engineering judgment or to waive any provisions of the "Lake County Subdivision Regulations." Where in unusual variances are in order that should be resolved between the County Engineer and the Developer/Engineer. The standard construction specifications of the State of Ohio shall be used unless so noted with the plan.

B. OVERALL SITE AND GRADING PLAN

1. Shall be made a part of all construction plans.

2. Shall contain the following information:

    a.) Existing and proposed contour lines (intervals to be two foot or as required by the County Engineer).

    b.) Location of pavement.

    c.) Location and size of storm sewers, and easements.

    d.) Location and size of watercourse, and easements including boundaries as determined by the National Flood Insurance Study.

    e.) When applicable minimum occupied floor elevation shall be displayed as determined by the National Flood Insurance rate maps or calculations.

    f.) Location of existing pond and retention ponds with outlet and emergency outlet elevations.

    g.) Sublot number.

    h.) Property lines.

C. HYDROLOGIC CALCULATIONS AND REQUIREMENTS

1. Runoff calculations shall take into account soil and topographic conditions.

2. The developer's engineer may be required to verify the existing storm water outlet capacity. If, in the judgment of the County Engineer, existing capacity is inadequate storm water detention or other remedies may be required.

3. To control pollution of public waters by soil sediment from accelerated stream channel erosion and to control flood plain erosion caused by accelerated storm

water runoff from development areas, the increased peak rates and volumes of runoff shall be controlled such that;

a. The peak rate of runoff from the *critical storm* and all more frequent storms occurring on the development areas does not exceed the peak rate runoff from a one year frequency, twenty-four hour storm occurring on the same area under pre-development conditions.
b. Storms of less frequent occurrence (longer return periods) than the critical storm up to the one hundred year storm have peak runoff rates no greater than the peak runoff rates from the equivalent size storms under pre-development conditions. Consideration of the one-, two-, five-, ten-, twenty five-, fifty-, and one hundred year storms will be considered adequate in designing and developing to meet this standard.

The critical storm for a specific development area is determined as follows:

a. Determine by appropriate hydrologic methods the total volume of runoff from a one-year frequency, twenty-four hour storm occurring on the development area before and after the development.
b. From the volumes determined in (a), determine the percent increase in the volume of runoff due to the development and using this percentage, select the twenty-four hour critical storm from this table.

If the percentage of increase in volume of runoff is		The critical storm for discharge limitation will be
Equal to or Greater than	And less than	
-	10	1 year
10	20	2 year
20	50	5 year
50	100	10 year
100	250	25 year
250	500	50 year
500	-	100 year

4. When applicable the National Flood Insurance Study shall be consulted for further regulations.

D. BRIDGES AND CULVERTS

1. A bridge is defined as any structure, including supports, of 10 feet or clearer span or 10 feet or more in diameter in, above or below a highway. The span of all bridges shall be measured along the centerline of the highway. In addition, multiple cell culverts under a fill with a distance of 10 feet or more between extreme ends of openings, including multiple pipes where the clear distance between the openings is less than half of the diameter of the smaller opening, shall also be regarded as a bridge.

2. All structures shall meet all current requirements of the Standard Specifications for Highway Bridges as adopted by the American Association of State Highway Officials as well as current supplements of the State of Ohio, Bureau of Bridges Design Regulations and Amending Memorandum.

3. Improvement plans must be submitted with complete structural and hydrologic calculations prepared by a licensed engineer.

4. Roadway culverts shall receive the same design considerations as bridges but may (if approved by the County Engineer) be designed for a 10-year storm return period.

5. Driveway culverts in roadside ditches shall be designed for a minimum three-year storm period and shall be 12" in diameter.

E. STORM SEWER SYSTEMS

1. Storm sewer calculations shall be submitted and exhibit conformance with these regulations. Calculations shall include hydraulic grade line with grade line at least six inches below inlet or manhole castings.

2. Storm sewers shall be designed for a minimum of three F.P.S. scour velocity.

3. Discharges shall be compatible with the existing facility into which the storm sewer is discharging. Hydrographs may be required in larger watersheds.

4. When constructed outside existing or proposed right-of-way a storm sewer easement shall be required.

    a.) The conduit shall be offset from the center of the easement to allow for a work area.

    b.) Easement shall provide a 12-foot minimum work area.

5. No direct connections from roof downspouts to storm sewers shall be permitted unless specifically approved by the County Engineer.

6. Direct connection from building footers to storm sewers shall not be allowed unless the centerline of the road elevation is one foot below the building footer elevation.

7. Storm sewers shall be inspected by video camera.

    a.) Inspection shall be recorded on a DVD.

    b.) A written report of sewer defects shall also accompany the DVD.

c.) The DVD and written report shall be submitted, and appropriate repairs made, prior to final acceptance of the storm sewer system.

8. The following design storm frequencies shall apply:

Sewer Type	Return Period (years)	Drainage Area
Local	3	
Collector	5	Greater than 50 acres
Major Trunk	10	Greater than 50 acres

9. The effects of a 100-year or less storm return period shall be considered as directed by the County Engineer.

10. Detention facilities may be required based upon upstream and downstream conditions. Criteria for detention facilities will be determined from watershed studies that may be required from the developer.

F. **OPEN CHANNELS**

1. Calculations for proposed and existing channel capacities shall be submitted with the plan.

2. The effects of a 100-year or lesser storm return period shall be considered as directed by the County Engineer.

3. Open channels within the Subdivision shall be designed such that the velocity of flow does not exceed the following velocities:

Soil Texture	**Allowable Velocity (V) in Ft. Per. Sec.**			
	Type of Channel Protection			
	Bare Channel	**Good Vegetation**	**Dump Rock**	**Channel Liner**
Sand, Silt, Sandy Loam, Silt Loam	1.5	3.0	<10	$\geq$10
Silty Clay Loam, Sandy Clay Loam	2.0	4.0	<10	$\geq$10
Clay	2.5	5.0	<10	$\geq$10

4. Channels shall have side slopes of three feet horizontal to one foot vertical or flatter, or as approved by the County Engineer.

5. Where constructed, disturbed or modified channels shall not exceed the capacity of the existing facility into which the open channel is discharging.

6. Where channels are constructed, disturbed or modified, a channel easement may be required. The minimum width shall be top of back to top of bank plus a 12-foot work area on one side.

7. Roadside ditches shall have side slopes two feet horizontal to one foot vertical or flatter.

8. Detention facilities may be required based upon upstream and downstream conditions. Criteria for detention facilities will be determined from watershed studies that may be required from the developer.

G. EROSION CONTROL

1. Seeding and Mulching

   a.) Shall be performed in accordance with ODOT 659.

   b.) Shall be performed on all disturbed areas resulting from construction of the Subdivision.

   c.) For Swales and Drainage Easements:

      1.) The following seed mixture shall be used at a rate of 3 #/1000 S.F. (percentages are by weight):

Kentucky Bluegrass	-	40%
Creeping Red Fescue	-	40%
Perennial Ryegrass	-	20%

      2.) Fertilizer: 12-12-12 @ 20 #/1000 S.F.

      3.) Mulch: 3 tons per 1 acre

      4.) Lime and Jute Matting as necessary

   d.) For Embankments and Shoulders:

      1.) The following seed mixture shall be used at a rate of 2 #/1000 S.F. (percentages are by weight)

Perennial Ryegrass	-	100%

2.)   Fertilizer: 12-12-12 @ 10 #/1000 S.F.

3.)   Mulch: 2 tons per 1 acre

4.)   Lime as necessary

e.)   For Steep Slopes and Channel Bank:

1.)   The following seed mixture shall be used at a rate of 1.5 #/1000 S.F. (percentage by weight)

Crown Vetch	-	40%
Perennial Ryegrass	-	60%

2.)   Fertilizer: 12-12-12 @ 20 #/1000 S.F.

3.)   Mulch: 2 tons per 1 acre

4.)   Lime and Jute Matting as necessary.

f.)   Erosion Control shall be used within ten (10) working days of the completion of operations on disturbed areas. Where unanticipated delays are encountered, the areas shall be seeded as soon as possible after the delay is recognized.

g.)   If seeding is not completed by November 1st; a mulch cover shall be applied to all unseeded areas.

2.   Sediment Basins – As Required

a.)   Volume shall be 200 cubic feet per acre disturbed by construction.

b.)   Dimensions – effective flow length shall be two times the width.

3.   Temporary erosion control shall conform to Ohio Department of Transportation 207.

4.   The developer shall evaluate the site for needed erosion control measures as directed by the Lake Soil and Water Conservation District per the Lake County Erosion & Sediment Control Rules or as directed by the Lake County Engineer.

H.   FILING OF CONSTRUCTION PLANS

Upon the Resolution of all comments from the review process and prior to posting of surety, and/or start of construction, a reproducible mylar construction drawings and plat title sheet shall be provided by the developer to the County Engineer for signature. Upon this submission all the signatures of the utilities, developers and the Township Trustees should be in place. Once signed by the County Engineer both title sheets and the

remainder of the plat pages will be copied and kept for permanent record. Once all signatures are obtained on construction plans a reproducible mylar copy shall be provided to the County Engineer.

I. "AS BUILT" REQUIREMENTS

Upon the completion of construction the developer/engineer shall provide to the County Engineer information on any incidental deviations from the plan involving any township or county facility in sufficient detail to allow conformance with 153.64 of the Ohio Revised Code. Revision of Construction Plans on file to "as-built" plans will be made by inspection staff. "As-built" drawing shall be submitted as a pdf file on a compact disk.

J. ROADWAYS – TYPICAL SECTIONS

1. In cases where specific design policies are not covered within these specifications, or the Lake County Subdivision Regulations, the current edition of "A Policy on Geometric Design of Highway and Street," published by the American Association of State Highway and Transportation Officials shall apply.

2. Roadways should conform to the following typical sections unless specifically approved by the County Engineer.

3. The pavement thickness shall be designed pursuant to the Ohio Department of Transportation's Design Manual.

K. CONSTRUCTION INSPECTION

The developer is required to provide for the inspection and testing of the various construction items. This generally can be provided for by the staff of the County Engineer with cost reimbursement by Developer. However due to staff limitations, an independent Registered Engineer/Surveyor may be hired for this purpose.

RAINFALL INTENSITIES FOR VARIOUS STORM FREQUENCIES IN
LAKE COUNTY, OHIO
(In/Hr)
Areas Less Than 200 Acres

Tc Min	2 yr.	3 yr.	5 yr.	10 yr.	25 yr.	50 yr.	100 yr.
5	4.09	4.61	5.27	6.16	7.33	8.22	9.11
6	3.88	4.37	4.99	5.84	6.96	7.80	6.64
7	3.69	4.16	4.75	5.56	6.62	7.42	8.23
8	3.52	3.97	4.54	5.30	6.32	7.08	7.85
9	3.37	3.8	4.34	5.07	6.04	6.78	7.51
10	3.23	3.64	4.16	4.86	5.79	6.50	7.20
11	3.10	3.50	4.00	4.67	5.57	6.24	6.92
12	2.99	3.37	3.85	4.50	5.36	6.01	6.66
13	2.88	3.25	3.71	4.34	5.17	5.79	6.42
14	2.78	3.14	3.58	4.19	4.99	5.60	6.20
15	2.69	3.03	3.46	4.05	4.82	5.41	6.00
16	2.60	2.94	3.35	3.92	4.67	5.24	5.81
17	2.53	2.85	3.25	3.00	4.53	5.08	5.63
18	2.45	2.76	3.16	3.69	4.40	4.93	5.46
19	2.38	2.68	3.07	3.58	4.27	4.79	5.31
20	2.32	2.61	2.98	3.49	4.15	4.66	5.16
21	2.25	2.54	2.90	3.39	4.04	4.53	5.02
22	2.20	2.48	2.83	3.31	3.94	4.42	4.89
23	2.14	2.41	2.76	3.22	3.84	4.31	4.77
24	2.09	2.35	2.69	3.14	3.75	4.20	4.66
25	2.04	2.3	2.63	3.07	3.66	4.10	4.55
26	1.99	2.25	2.57	3.00	3.57	4.01	4.44
27	1.95	2.20	2.51	2.93	3.49	3.92	4.34
28	1.91	2.15	2.45	2.87	3.42	3.85	4.25
29	1.87	2.10	2.4	2.81	3.35	3.75	4.16
30	1.83	2.06	2.35	2.75	3.28	3.67	4.07
31	1.79	2.02	2.31	2.70	3.21	3.60	3.99
32	1.75	1.98	2.26	2.64	3.15	3.53	3.91
33	1.72	1.94	2.22	2.59	3.09	3.46	3.84
34	1.69	1.90	2.17	2.54	3.03	3.40	3.76
35	1.66	1.87	2.13	2.50	2.97	3.33	3.69
36	1.63	1.84	2.10	2.45	2.92	3.27	3.63
37	1.60	1.80	2.06	2.41	2.87	3.22	3.56
38	1.57	1.77	2.02	2.37	2.82	3.16	3.50
39	1.55	1.74	1.99	2.33	2.77	3.11	3.44
40	1.52	1.71	1.96	2.29	2.73	3.06	3.39
41	1.49	1.69	1.93	2.25	2.68	3.01	3.33
42	1.47	1.66	1.89	2.21	2.64	2.96	3.28
43	1.45	1.63	1.86	2.18	2.60	2.91	3.23
44	1.43	1.61	1.84	2.15	2.56	2.87	3.18
45	1.40	1.58	1.81	2.11	2.52	2.82	3.13
46	1.38	1.56	1.78	2.08	2.48	2.78	3.08
47	1.36	1.54	1.76	2.05	2.45	2.74	3.08
48	1.34	1.52	1.73	2.02	2.41	2.70	3.00
49	1.33	1.49	1.71	2.00	2.38	2.67	2.95
50	1.31	1.47	1.68	1.97	2.34	2.63	2.91

RAINFALL INTENSITIES FOR VARIOUS STORM FREQUENCIES IN
LAKE COUNTY, OHIO
(In/Hr)
Areas Less Than 200 Acres

Tc Min	2 yr.	3 yr.	5 yr.	10 yr.	25 yr.	50 yr.	100 yr.
51	1.29	1.45	1.66	1.94	2.31	2.59	2.87
52	1.27	1.43	1.64	1.92	2.28	2.56	2.84
53	1.26	1.42	1.62	1.89	2.25	2.52	2.80
54	1.24	1.40	1.60	1.87	2.22	2.49	2.76
55	1.22	1.38	1.58	1.84	2.19	2.46	2.73
56	1.21	1.36	1.56	1.82	2.17	2.43	2.69
57	1.19	1.35	1.54	1.80	2.14	2.4	2.66
58	1.18	1.33	1.52	1.77	2.11	2.37	2.63
59	1.16	1.31	1.50	1.75	2.09	2.34	2.60
60	1.15	1.30	1.48	1.64	1.95	2.19	2.42
61	1.14	1.28	1.46	1.71	2.04	2.29	2.53
62	1.12	1.27	1.45	1.69	2.02	2.26	2.51
63	1.11	1.25	1.43	1.67	1.99	2.24	2.48
64	1.10	1.24	1.42	1.65	1.97	2.21	2.45
65	1.09	1.23	1.40	1.64	1.95	2.19	2.42
66	1.07	1.21	1.38	1.62	1.93	2.16	2.40
67	1.06	1.20	1.37	1.60	1.91	2.14	2.37
68	1.05	1.19	1.35	1.58	1.89	2.12	2.35
69	1.04	1.17	1.34	1.57	1.87	2.09	2.32
70	1.03	1.16	1.33	1.55	1.85	2.07	2.30
71	1.02	1.15	1.31	1.54	1.83	2.05	2.27
72	1.01	1.14	1.30	1.52	1.81	2.03	2.25
73	1.00	1.13	1.29	1.50	1.79	2.01	2.23
74	0.99	1.12	1.27	1.49	1.77	1.99	2.21
75	0.98	1.10	1.26	1.48	1.76	1.97	2.18
76	0.97	1.09	1.25	1.46	1.74	1.95	2.16
77	0.96	1.08	1.24	1.45	1.72	1.93	2.14
78	0.95	1.07	1.23	1.43	1.71	1.92	2.12
79	0.94	1.06	1.21	1.42	1.69	1.90	2.10
80	0.93	1.05	1.20	1.41	1.68	1.88	2.08
81	0.93	1.04	1.19	1.39	1.66	1.86	2.06
82	0.92	1.03	1.18	1.38	1.65	1.85	2.05
83	0.91	1.03	1.17	1.37	1.63	1.83	2.03
84	0.90	1.02	1.16	1.36	1.62	1.81	2.01
85	0.89	1.01	1.15	1.35	1.60	1.80	1.99
86	0.89	1.00	1.14	1.33	1.59	1.78	1.97
87	0.88	0.99	1.13	1.32	1.58	1.77	1.96
88	0.87	0.98	1.12	1.31	1.56	1.75	1.94
89	0.86	0.97	1.11	1.30	1.55	1.74	1.93
90	0.82	0.97	1.10	1.29	1.54	1.72	1.91
95	0.82	0.93	1.06	1.24	1.48	1.65	1.83
100	0.79	0.89	1.02	1.19	1.42	1.59	1.76
105	0.76	0.86	0.98	1.15	1.37	1.53	1.70
110	0.74	0.83	0.95	1.11	1.32	1.48	1.64
115	0.71	0.80	0.92	1.07	1.28	1.43	1.59
120	0.69	0.78	0.89	1.04	1.24	1.39	1.54

THIS PAGE INTENTIONALLY LEFT BLANK